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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/820,385	03/29/2001	Shunji Wada	WATA:010	5498

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EXAMINER

ROY, SIKHA

ART UNIT	PAPER NUMBER
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2879

DATE MAILED: 07/31/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/820,385

Applicant(s)

WADA ET AL.

Examiner

Sikha Roy

Art Unit

2879

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 29 March 2001.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☐ Claim(s) _____ is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-5 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1- 5 are rejected under 35 U.S.C. 103(a) as being unpatentable over U. S. patent 6,303,239 to Arai et al. in view of applicants' admitted prior art and further in view of U. S. Patent 5,180,476 to Ishibashi et al.

Referring to claim 1 Arai et al. disclose (column 1 lines 11-20, Fig 3) a transparent (glass) substrate 11 and a hole injecting electrode 12 made of transparent conductive film of ITO formed on the glass substrate. Arai et al. further discloses (column 5 lines 19-31) hole injecting electrode composed of a material having work function of 4.5 eV to 5.5 eV.

Claim 1 differs from Arai et al. in that Arai et al. do not exemplify the transparent conducting film having surface roughness of 1 to 10 nm and specific resistance of $1.6 \times 10^{-4} \Omega \cdot \text{cm}$.

The applicants' admitted prior art section discloses (page 3 lines 18, 30) the transparent conducting film has surface roughness of 10 nm or less. It is further disclosed that minimized surface roughness prevents the formation of dark spots and hence increases the durability of the EL device.

Art Unit: 2879

Therefore it would have been obvious to one of ordinary skill in the art at the time of invention to include the surface roughness of 1 to 10 nm of the film of Arai et al. as suggested by applicants' prior art for preventing the formation of dark spots and increasing the durability of the EL device.

Regarding claim 1, Arai et al. and applicants' admitted prior art do not disclose the specific resistance of the transparent conducting film being $1.6 \times 10^{-4} \Omega \cdot \text{cm}$ or less.

Ishibashi et al. in relevant art of producing transparent conductive films disclose (column 7 lines 28-31) transparent conductive film of ITO with a specific resistance of $1.25 \times 10^{-4} \Omega \cdot \text{cm}$. It is further disclosed that this film with such low specific resistance results in improving the image quality and has superior etching characteristics (column 1 lines 60-65, column 3 lines 55-60).

Therefore it would have been obvious to one of ordinary skill in the art at the time of invention to have the specific resistance of $1.25 \times 10^{-4} \Omega \cdot \text{cm}$ as suggested by Ishibashi et al. of the transparent conductive film of Arai et al. and applicants' admitted prior art for improving the image quality of the EL device.

Regarding claim 2 Arai et al. disclose the transparent conducting electrode is made of ITO, which is a mixture of indium oxide In_2O_3 and tin oxide SnO_2 the desired mixing ratio of SnO_2 with respect to In_2O_3 being in the range 5 to 12 wt % which covers the claimed range of 4 to 6 wt %. The Examiner notes that the claim limitation that "the film is formed on the substrate by ion plating method " is drawn to a process of manufacturing which is incidental to the claimed apparatus. It is well established that a

Art Unit: 2879

claimed apparatus cannot be distinguished over the prior art by a process limitation.

Consequently, absent a showing of an unobvious difference between the claimed product and the prior art, the subject product-by-process claim limitation is not afforded patentable weight (see MPEP 2113). Therefore, it is the position of the examiner that it would have been obvious to one of ordinary skill in the art that the transparent conducting film disclosed by Arai et al. in view of the applicants't admitted prior art is at least a fully functional equivalent to the Applicant's claimed invention.

Regarding claims 3 and 5 Arai et al. disclose (column 6 lines 20-27, column 10 lines 35-40 Fig.4) an organic electroluminescent device comprising a multilayer film structure including hole transporting layer 14, the light emitting layer 15 and electron transporting layer 16 each formed of organic material and laminated in sequence on the surface of the transparent conductive film. The rest of the limitations being same as claim 1 are rejected as claim 1 (see rejection of claim 1).

Regarding claim 4, Arai et al. in view of applicants' admitted prior art and Ishibashi et al. disclose the energy barrier between the conductive film and the hole transport layer to be small for operating the device at lower driving voltage but do not disclose the limitation of energy barrier being equal to or smaller than 0.7ev. It has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. *In re Boesch*, 205 USPQ 215 (CCPA 1980). Thus, it would have been obvious to one of ordinary skills in the art at the time the invention was made to specify the energy barrier between the conductive film and the hole transport layer to be

Art Unit: 2879

0.7 eV or less, since discovering an optimum value of a result effective variable is considered within the skills of the art.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. The following prior art references are cited to further show the state of the art with respect to organic electroluminescent device.

U.S. Patent 5,886,464 to Shi et al.

U.S. Patent 5,739,635 to Wakimoto

U.S. Patent 5,719,467 to Antoniadis et al.

U.S. Patent 6,133,581 to Terao et al.

U.S. Patent 6,239,453 to Yamada et al. disclose that the specific resistance of ITO film can be controlled within range of $10^{-4} \Omega \cdot \text{cm}$ to $10^{-2} \Omega \cdot \text{cm}$ by adjusting the ratio of SnO_2 at the time of preparation of ITO film.

Contact Information


Any inquiry concerning this communication or earlier communications from the examiner should be directed to Sikha Roy whose telephone number is (703) 308-2826. The examiner can normally be reached on Monday-Friday 8:00 a.m. – 4:30 p.m.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nimeshkumar D. Patel can be reached on (703) 305-4794. The fax phone number for the organization is (703) 308-7382.

Art Unit: 2879

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

Sikha Roy
Patent Examiner
Art Unit 2879



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